Oct. 2, 1934. C. H. GAMBELL 1,975,266

OIL PILOT FOR HYDROCARBON BURNERS

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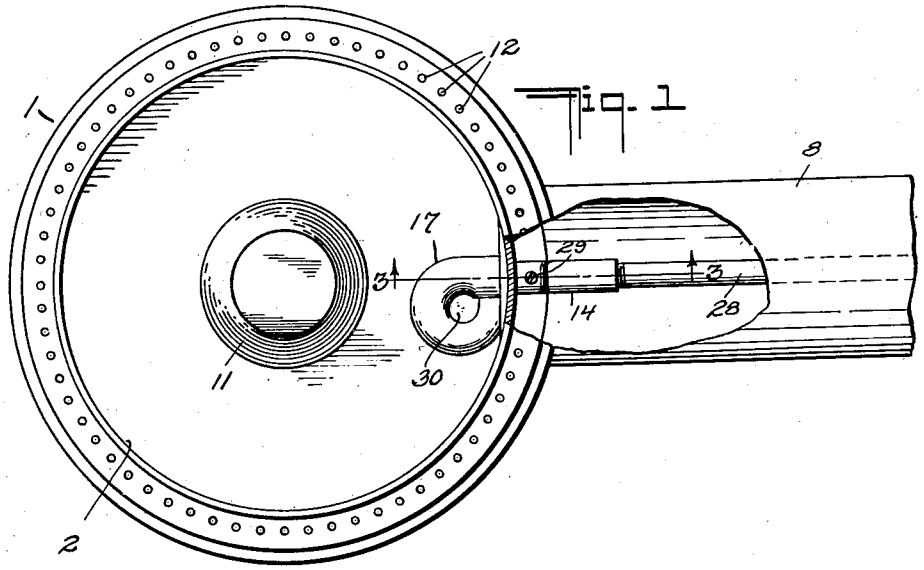


Fig. 1

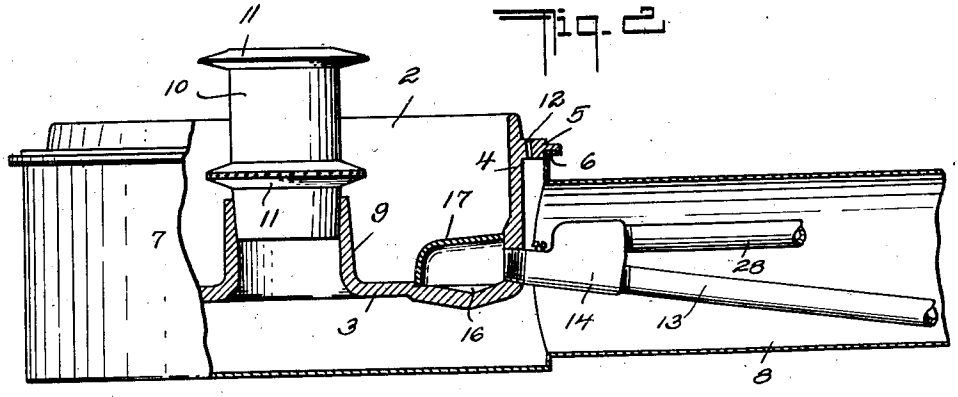


Fig. 2

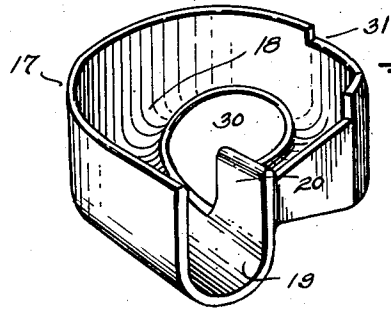


Fig. 7

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Fig. 3

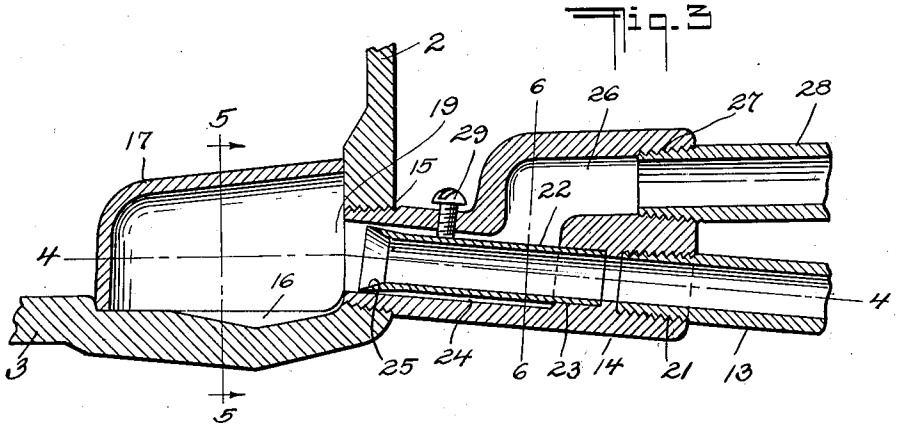


Fig. 4

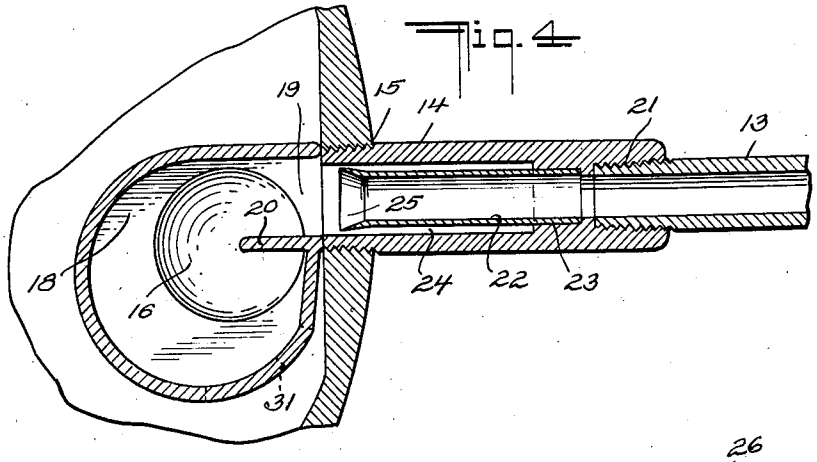


Fig. 5

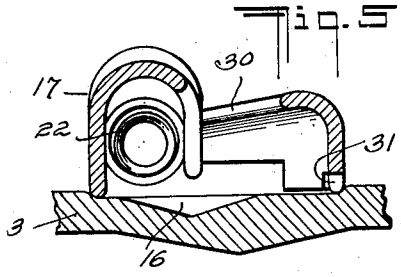
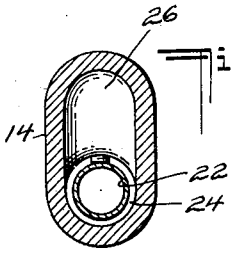


Fig. 6



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UNITED STATES PATENT OFFICE

1,975,266

OIL PILOT FOR HYDROCARBON BURNERS

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Application October 23, 1930, Serial No. 490,698

5 Claims. (Cl. 158—92)

This invention relates to oil pilots for use in effecting combustion in hydrocarbon fuel burners, especially fuel burners of the automatic type utilized for residence and building heating purposes. In the operation of such burners or heating units, it has been customary heretofore to employ a small constantly burning pilot flame which is maintained by the employment of a gaseous fuel. Such pilots have not been entirely satisfactory for the reason, among others, that the gaseous fuel supplied thereto is obtained from municipal mains and is subject to fluctuation in pressure supply and furthermore is relatively costly in continuous operation.

It is therefore an outstanding object of the present invention to provide an oil pilot for such burners which utilizes the same fuel, namely fuel oil, employed in effecting the operation of the main burner, whereby an economical and satisfactory pilot is provided which is independent of extraneous sources of fuel supply.

It is another object of the invention to provide an oil burning pilot of the character specified wherein provision is made for carbureting the oil fuel supplied thereto with air in such manner that an efficient combustible mixture is produced by which the pilot may burn without smoking and producing disagreeable odors and forming objectionable carbon deposits.

With these and other objects in view, which will appear as the description proceeds, the invention consists in the novel features of construction, combination of elements and arrangements of parts hereinafter fully described and pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a top plan view of an oil burning heating unit wherein is embodied the oil pilot mechanism comprising the present invention;

Fig. 2 is a vertical longitudinal sectional view taken through the burner unit and the associated oil pilot mechanism;

Fig. 3 is a similar view on an enlarged scale taken on the plane indicated by the line 3—3 of Fig. 1;

Fig. 4 is a horizontal sectional view, the plane of which is disclosed by the line 4—4 of Fig. 3;

Fig. 5 is a transverse vertical sectional view on the line 5—5 of Fig. 3;

Fig. 6 is a similar view on the line 6—6 of Fig. 3, and

Fig. 7 is a perspective view showing the interior of the mixing shell used in connection with the present invention.

Referring more particularly to the drawings, the numeral 1 designates an oil burner of the type adapted for installation in the heating furnaces of residences and other buildings. The burner depicted is shown as comprising a vaporizing and combustion vessel 2. This vessel consists of a circular cast iron structure having a bottom 3 and an open top. The circular side wall 4 of the vessel is provided adjacent to its upper and outer edge with an annular flange 5, which is seated upon a corresponding flange 6 formed with the upper portion of a supporting casing 7. This casing is connected by means of a conduit 8 with a source of forced air supply (not shown) such as a motor driven fan. The bottom of the vessel 2 is spaced from the bottom of the casing 7, as shown in Fig. 2 and air entering the casing passes upwardly through an upstanding sleeve 9 formed axially in connection with the bottom wall 3 of said vessel. Secured in the upper portion of the sleeve 9 is a riser or air distributor 10 which is formed with an open bottom and a closed top. The air distributor is provided with one or more vertically spaced circular heads 11, which are formed with a plurality of ports by which streams or jets of air are directed outwardly and radially from the air distributor to combine with vaporized oil released from the bottom of the vessel 2 to produce the main combustible mixture. A secondary body of air is supplied to this mixture by providing the flange 5 with a plurality of upwardly and inwardly inclined ports 12, which latter directs streams of air into the primary combustible mixture produced in the vessel to produce substantially smokeless combustion with but a minimum of carbon formation. While the oil burner is preferably of the construction shown and described, nevertheless it will be understood that the present invention which is directed to an oil pilot is not necessarily limited for use in connection therewith, and the burner mechanism disclosed has been selected merely for purposes of facilitating a clear understanding of the invention, and its manner of use in practical operation.

An oil supply pipe line is indicated by the numeral 13 and leads from a source of oil supply, not shown, the flow of oil through the pipe being regulated preferably by automatic means, such as a control valve, not illustrated, by which oil is delivered through the line 13 either under gravity or pressure in regulated quantities. Such oil control mechanism has been disclosed in a copending application filed by Augustus J. Frame, Serial No. 489,635 filing date Oct. 18, 1930, and inasmuch as it does not constitute a part of the

present invention, illustration thereof is not here deemed necessary.

The pipe line 13 at its forward end terminates in a connection 14 which is threaded into the lower part of the vessel 2 as indicated at 15 in Fig. 2. The bottom wall 3 of the vessel, adjacent to the connector is formed with a sump 16 and positioned over this sump is a shell 17. The shell is formed to embody a substantially circular passageway indicated at 18. The oil and air inlet 19 of the shell is arranged laterally to one side thereof in registration with the discharge end of the connector 14, so that the oil and air entering the shell will be given a whirling or rotary movement by contact with the substantially circular outer wall of the shell. This whirling movement is assured by the provision of a baffle 20 integrally formed with the shell and which limits the entrance of the oil and air mixture to one side of the shell, as indicated more particularly in Figs. 4 and 5.

The connector 14 includes a threaded socket 21 with which the oil supply line 13 is connected, and arranged within the connector in axial registration with the pipe 13 and constituting in effect a continuation thereof is a short tube section 22 which is supported at one end within a socket 23 formed in the connector adjacent to the socket 21. Beyond the socket 23, the tube section is arranged within the main passageway 24 of the connector and this passageway is of slightly greater diameter than the flaring outer end 25 of the tube section 22. The forward end of the passageway 24 communicates directly with the passageway 18 in the shell 17, while the other end of the passageway 24 terminates in a laterally offset portion 26 which is provided with a threaded socket 27 adapted for the reception of a similarly threaded end of an air supply pipe 28. The other end of the pipe 28 terminates within the conduit 8, so that air under pressure passing through the conduit 8 enters the pipe 28 and flows through the passageway 24 around the tube section 22, producing a suction or aspirating effect at the flaring end 25 of the tube section 22, which assists in withdrawing liquid oil from the tube 22 and at the same time producing a mixture therewith. The operating positions of the tube 22 in the passageway 24 is subject to regulation by means of a set screw 29, which may be operated to flex the unsupported end of the tube 22 to obtain desired positions of the flaring end 25 thereof in the main passageway 24. Further, the set screw 29 is provided to force the unsupported end of the tube 22 downwardly until the lower flaring edge 25 is in direct contact with the bottom of the connector passage 24. The tube in this position has been found to give best results which is perhaps due to the fact that the increased spacing of the upper side of the tube 22 from the wall of the passage 24 will provide for the entrance of a greater amount of air above the oil body, thereby effecting a more complete vaporization of the oil.

Due to the curved walls of the shell 17 and the provision of the baffle 20 therein, this air and oil mixture whirls rapidly in the shell 17 to produce an intimate mixture of the oil and air which will burn with a substantially blue flame. The top of the shell, in registration with the center of the sump 16 is formed with an opening 30 by which the pilot mixture escapes for combustion purposes immediately over the shell. Further, due to the pressure of the air and the curved wall structure of the shell, liquid oil particles or globules, under conditions of limited oil flow, work by gravity and air pressure into the sump 16, maintaining a sufficient supply of oil in this sump to provide for sustained and efficient combustion. When the burner 1 however is in active operation and a full supply of oil flows through the pipe 13, this excess oil passes from the shell by way of the outlet 31 into the bottom of the vessel 2, where the oil enters in a relatively thin body over the bottom wall 3 of said vessel. Due to the heat of combustion, this oil readily vaporizes and unites with the streams of air issuing from the distributor 10 and the ports 12 to support the principal combustion operation of the burner.

In view of the foregoing, it will be seen that the present invention provides an oil burning pilot for oil consuming heating units which will function to maintain an efficient pilot flame when the heating unit proper is ineffective. Of course, it will be understood that such heating units operate under thermostatic control to maintain a substantially constant temperature in the rooms of a building and that by reason of this thermostatic control, the operation of the burner unit is essentially intermittent, presenting successively periods of heat activity and inactivity. It is during these periods of inactivity that the oil pilot is maintained so that when the main flow of oil is again resumed, a flame is present to initiate combustion thereof. The provision of the shell and its peculiar construction serves to maintain the pilot flame steady and constant, prevents drafts from affecting the same so that the pilot will be completely reliable in operation. As stated, the use of oil as the fuel for the pilot flame removes the necessity for employing a gaseous fuel, and widens the scope of use of automatic oil heaters, particularly in localities where a gaseous fuel can not be readily obtained. The operation of the aspirator formed by the tube 22 and the passageway 24 results in securing efficient mixture of the air and liquid oil particularly under conditions of limited oil flow which obtain during relative inactivity of the burner unit, and the effectiveness of this mixture is further increased by the whirling and concentrating action which is exercised thereon by the construction of the shell, so that a pilot flame is produced which burns satisfactorily with a somewhat bluish color in marked contrast with the weak, yellow, smoky flame produced by oil pilots heretofore developed for this purpose.

What is claimed is:

1. In a combined oil burner and pilot structure, a vaporizing chamber having a fuel inlet, a fuel supply line leading to said chamber, an atomizing nozzle arranged to discharge through said inlet, and a substantially circular mixing shell arranged within the vaporizing chamber in registration with the fuel inlet tangentially disposed thereto to cause a whirling action of the atomized fuel to provide an intimate mixture of the fuel and air, said shell having outlets for the discharge of atomized and unatomized fuel.

2. In a combined oil burner and pilot structure, a vaporizing chamber, a fuel supply line leading to said chamber, an air supply line for delivering air under pressure to said chamber, the end of said fuel supply line terminating within the end of the air supply line at its point of connection to said chamber, the air supply line possessing a slightly greater diameter than the diameter of the fuel supply line to provide for high velocity air flow past the discharge end of the fuel

line to atomize the fuel, and a mixing shell having openings for the discharge of atomized and unatomized oil and a substantially circular sidewall arranged within said chamber and tangentially connected to said air supply line to impart a whirling action to the atomized fuel, said shell being provided with a baffle wall cooperating with the inlet to said shell to aid said whirling action.

3. A liquid fuel burner comprising a vaporizing bowl including a fuel supporting base, means having a curved wall within said bowl and coacting with said base to form a mixing and separating chamber having an outlet in its top, and an outlet adjacent its base for discharging unatomized liquid fuel onto said fuel supporting base from said chamber, means for delivering a stream of atomized oil into said chamber against said wall to produce a whirling of the atomized fuel, and means for delivering air to said bowl.

4. A liquid fuel burner and pilot structure comprising a vaporizing bowl including a fuel supporting base, means within said bowl and coacting with said base to form a circular mixing and separating chamber having an outlet in its top, and an outlet adjacent its base for discharging separated liquid fuel onto said fuel supporting base from said chamber, means for delivering a stream of atomized oil tangentially into said chamber, and means for delivering air to said bowl.

5. A liquid fuel burner and pilot structure comprising a vaporizing bowl including a fuel supporting base, means within said bowl and coacting with said base to form a circular mixing and separating chamber having an outlet in its top, and an outlet adjacent its base for discharging separated liquid fuel onto said fuel supporting base from said chamber, said base having means within said shell to maintain a pool of fuel therein, means for delivering a stream of atomized oil tangentially into said chamber, and means for delivering air to said bowl.

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